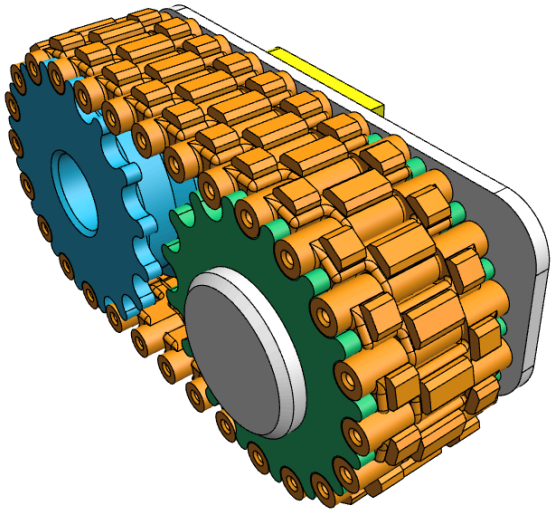
3D Printed Sprocket & Track Unit

Simple Modular Track System for Small Robots

By: Ridzwan Normahazan @ Domechy | DCY-01 | Aug 2025 | Ver 1



1. Overview

A modular 3D-printed sprocket and track unit designed for small DIY robotics. The system consists of interlocking track links and matching sprockets. No tensioner roller is used for the sake of simplicity. Applications include hobbyist projects, small tracked robots, educational platforms, and prototypes.

2. Design Elements

Part	Function	Notes
Drive Sprocket	Connected to DC motor, drives the system	Solid center hole
Idler Sprocket	Freely rotating sprocket	Hollow center hole for shaft
Track	Transfers motion between sprockets	Made of track links
Track link	Small link that forms the track	Interlocking design

3. Mechanical Design & Process

3.1 Sprocket Design

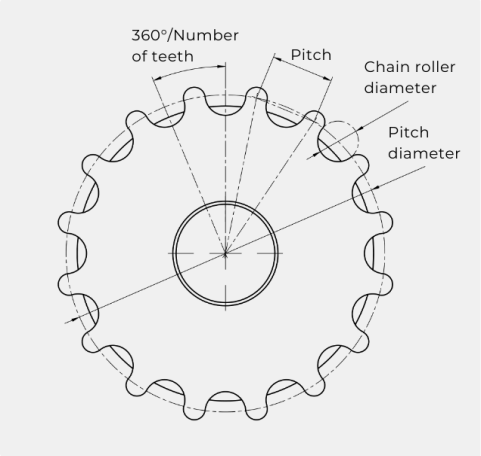


Figure 1: Sprocket geometry and key dimensions

General considerations: pitch, pitch circle diameter (PCD), and number of teeth. Smaller pitch gives smoother track motion. For 3D printing, tolerances must be considered.

Pitch (P) can be calculated from pitch circle diameter (PCD) and number of teeth (N):

$$P = PCD\sin\left(\frac{180^\circ}{N}\right) \qquad \ldots (1)$$

If pitch is known, the pitch circle diameter (PCD) can be calculated as:

$$PCD = \left(\frac{P}{\sin\left(\frac{180^\circ}{N}\right)}\right) \qquad \ldots (2)$$

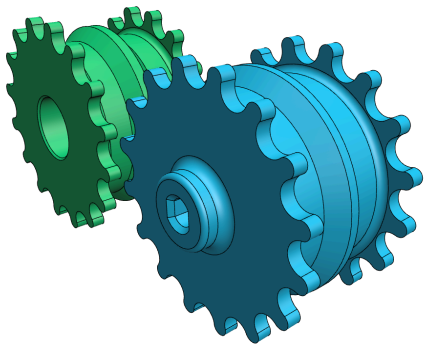


Figure 2: CAD design of idler sprocket (left) and drive sprocket (right)

3.2 Track Design

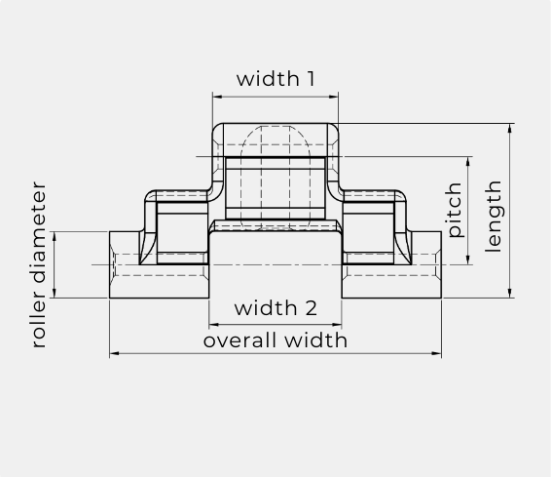


Figure 3: track link geometry and key dimensions

Each track is made of multiple interlocking track links connected with filament. The pitch of the track link matches the sprocket pitch. Roller diameter should be equal or slightly smaller than sprocket rollers for smooth operation.

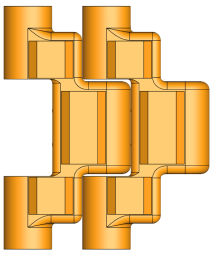


Figure 4: Two track links interlocking with each other

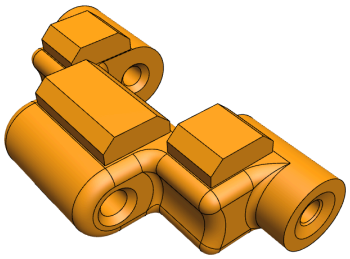


Figure 5: track link design

3.3 Assembly

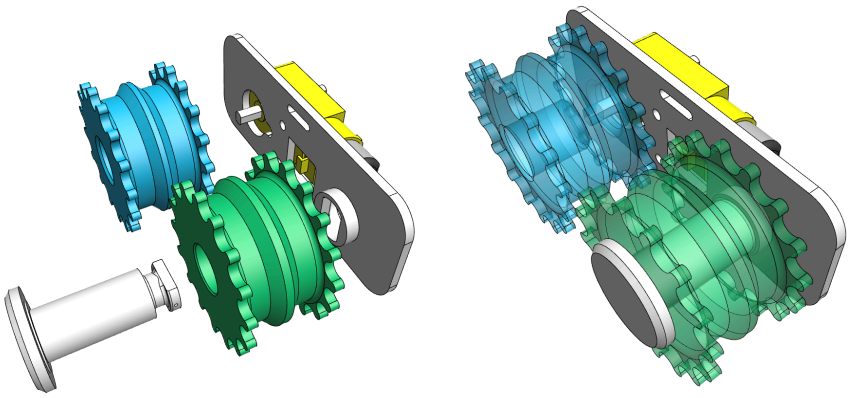


Figure 6: Sprockets, shaft and frame assembly

The drive sprocket is mounted on the DC motor shaft, which serves as the reference point. The idler sprocket rotates freely on a shaft inserted through its hollow center. The frame is a simple plate supporting both shafts, and can be adapted into a robot chassis. The distance between sprockets is determined by multiplying the pitch we calculated earlier.

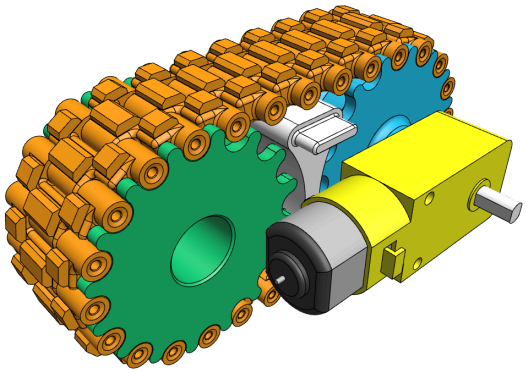


Figure 7: A DC motor is connected to the drive sprocket

4. Testing & Iteration

The sprocket and track assembly was attached to a DC motor and tested. The motion was smooth, with no derailment. For future iterations, the track threads will be printed in TPU while the other components remain in PETG. This material combination is expected to increase friction between the track and the floor surface, while reducing friction between the track link rollers and the sprocket teeth.

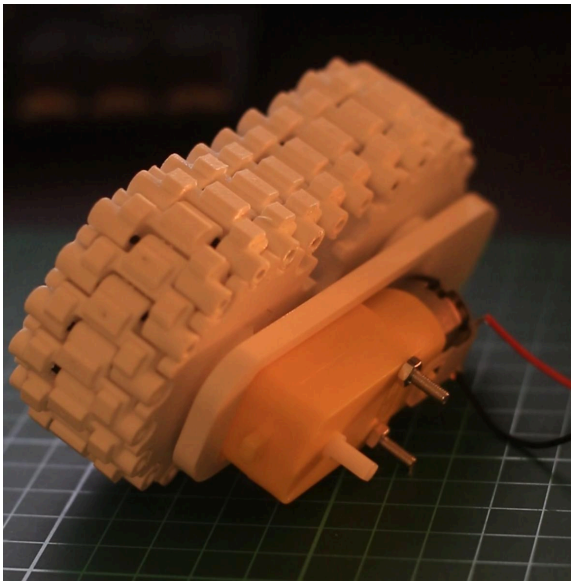


Figure 8: Actual 3D printed parts assembly

5. Notes & Tips

• Shorter sprocket pitch → smoother track motion.
• Ensure correct tolerances when 3D printing interlocking track links.
• Grooves on sprocket & track help keep the track aligned.

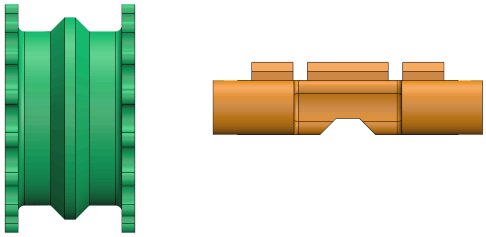


Figure 9: Front view of the sprocket and track link